Applied Magnetic Resonance 1990 vol.1 N1, pages 113-127

1H NMR study of static and fluctuating internal Magnetic fields in Tb(C2H5SO4)3 · 9 H2O ising ferromagnet

Aminov L., Volodin A., Egorov A., Naletov V., Tagirov M., Teplov M., Feller G.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

The pulsed NMR method is applied to an analysis of a complicated structure of inhomogeneous internal fields in a ferromagnetic crystal. Proton magnetic resonance in the Ising ferromagnet TbES at a temperature range from 1.6 K down to 35 mK is studied at frequencies of 10-35 MHz. A complicated picture of static and fluctuating internal magnetic fields in the crystal is presented. Interatomic distances are shown to have an uncertainty of the order of 0.2% due to defects in the crystal lattice. The fluctuations of internal magnetic fields produced by thermal excitation and spin-spin relaxation of Tb3+ ions give rise to the effective nuclear magnetic relaxation: 1/T1(2)~exp (δ/kT), where δ is the energy splitting of the lowest Tb3+ quasi-doublet. The rate of these fluctuations in TbES at low temperatures is approximately equal to 2×107 s-1 being independent of temperature and magnetic field. © 1990 Springer.

http://dx.doi.org/10.1007/BF03166015